

Claims

1. A method of transporting data over the Iub/Iur interface of a UMTS Terrestrial Radio Access Network, UTRAN, in which frame synchronisation at the receiving node is achieved by delaying the sending of data frames from the sending node by an offset delay, the method comprising:

for speech services, defining said offset delay as a substantially fixed delay; and

for data services, defining an initial offset delay and dynamically varying the delay at the sending node based upon Time of Arrival feedback received from the receiving node, to optimise the offset delay value.

2. A node for use in a UMTS Terrestrial Radio Access Network, UTRAN, the node comprising:

means for transmitting data frames to one or more receiving nodes via Iub/Iur interfaces with an initial timing offset; and

means for applying dynamically varying the offset for data services based upon Time of Arrival feedback received from the receiving node(s), whilst maintaining the timing offset substantially constant for speech services.

3. A method of optimising the timing offsets with which data frames are transmitted over the Iur/Iub interfaces of a UMTS Terrestrial Radio Access Network, UTRAN, the method comprising:

for a given Iur/Iub interface or set of Iur/Iub interfaces over which identical user plane data is to be sent, defining a duration of a data frame receiving window for use by the receiving node(s);

transmitting data frames from a sending node with an initial timing offset;

reducing the timing offset at the sending node in a stepwise manner; and

adjusting the timing offset at the sending node in response to the receipt of late Time of Arrival error reports at the sending node.

4. A method according to claim 3, wherein upward adjustments in the timing offset are carried out in steps which are greater than the steps by which the timing offset is reduced.

5. A method of optimising the timing offsets with which data frames are transmitted over the Iur/Iub interfaces of a UMTS Terrestrial Radio Access Network, UTRAN, the method comprising:

for a given Iur/Iub interface or set of Iur/Iub interfaces over which identical user plane data is to be sent, defining a duration of a data frame receiving window for use by the receiving node(s);

transmitting data frames from a sending node with an initial timing offset;

at the or each receiving node, collecting and/or computing Time of Arrival statistics for received data frames;

periodically reporting said statistics to the sending node; and

adjusting the timing offset at the sending node on the basis of the received statistics.

6. A method according to claim 5, wherein the collected statistics include one or more of; the mean, minimum, maximum, and variance of Times Of Arrival for data frames received during some time period.

7. A method according to claim 6 and comprising sending from the sending node to the or each receiving node instructions identifying the statistics to be collected at the receiving node and sent to the sending node.

8. A method according to claim 7, wherein said instructions identify the regularity with which the statistics must be sent, or events defining when the statistics should be sent.

9. A method according to any one of claims 5 to 7 and comprising sending polling requests from the sending node to the or each receiving node instructing the return of statistics.

10. A method according to any one of claims 3 to 9, wherein the sending node is one of a Radio Network Controller, RNC, or a NodeB, and the or each receiving node is the other of an RNC or NodeB.

11. A method according to any one of claims 3 to 10, wherein said initial offset value is sufficient to ensure a likelihood that the frames will be received at the or each receiving node within the defined receiving window
12. A node for use in a UMTS Terrestrial Radio Access Network, UTRAN, the node comprising:
 - means for transmitting data frames to one or more receiving nodes via Iub/Iur interfaces with an initial timing offset;
 - means for reducing the timing offset in a stepwise manner; and
 - means for adjusting the timing offset in response to the receipt of late Time of Arrival error reports.
13. A node for use in a UMTS Terrestrial Radio Access Network, UTRAN, the node comprising:
 - means for transmitting data frames to one or more receiving nodes via Iub/Iur interfaces with an initial timing offset; and
 - means for receiving statistical data sent periodically from the or each receiving node and relating to the Times of Arrival of data frames at respective receiving nodes, and for adjusting the timing offset on the basis of the received statistics.
14. A method according to claim 11 or 13, wherein the node is a Radio Network Controller or a NodeB.